BRONCHOPNEUMONIA IN EARLY CHILDHOOD—ITS TREATMENT*

By E. P. Cook, M. D.
San Jose

Discussion *by Edward J. Lamb, M. D., Santa Barbara; William A. Beattie, M. D., Sacramento; Adelaide Brown, M. D., San Francisco.*

THE knowledge which has been gained in recent years concerning the etiology and pathology of bronchopneumonia has not resulted in any striking increase in our ability to cope with this disease successfully. Possessing no specific remedy, the problem is at once a challenge to our therapeutic ingenuity and resourcefulness. Many different agents of undoubted worth are used, and it is my present purpose to attempt to assemble and coördinate these procedures, none of which are original, into a systematic plan of treatment. Such a plan places in the foreground the carefully considered management of the case as a whole, rather than focusing our attention too minutely on drug therapy. Pneumonia is simply another instance in which the child, as a whole, is sick, even though the major pathological processes are limited to the air passages and lungs.

PATHOLOGY

The upper air passages, being inhabited by a great variety of microörganisms and extending directly into the lungs, make possible the development of bronchopneumonia under a variety of conditions. Infectious diseases are by far the most important group of predisposing causes. Measles, whooping-cough, and influenza are familiar examples. Simple infections of the respiratory tract, the so-called mixed respiratory infections, and bronchitis are also of the utmost importance. We may, in fact, have great difficulty in determining whether or not a bronchitis has advanced to a point where it should be called bronchopneumonia. Fortunately our treatment does not depend upon the answer to this question, but rather we must be guided by the degree of illness as evidenced by the toxemia, fever, and general prostration of the patient.

SYMPTOMS

The clinical course of a primary infection is fairly definite. The abrupt onset with fever, prostration, and rapid pulse denotes an acute infection. The appearance of cough and dyspnea will direct our attention to the lungs, where the initial signs are faint or impure breath sounds over a localized area, followed in a day or two by râles. Bronchial breathing is heard only where large areas of consolidation occur. Physical findings will change from day to day as different bronchial areas become involved with exudate. The duration is indefinite, varying from a few days to several weeks or months.

In the secondary type of infection the problem is more difficult. A sudden rise in temperature and onset of cough during the course of an acute infectious disease should never fail to direct one's attention to the lungs. X-ray examination of the chest will serve to confirm the diagnosis.

PROPHYLAXIS

Like every other disease, bronchopneumonia is easier to treat by preventing its development; and since certain things can be accomplished along this line, it is well to bear them in mind. It is not controllable by ordinary public health methods of isolation, quarantine, and supervision of food and water supply. Without introducing an alarming note, it is quite in order to state frankly to parents of children having measles, whooping-cough, influenza, and the other acute infectious diseases that the mortality in these conditions is in large part due to the development of pneumonia, and therefore their utmost care and cooperation is urged in keeping the child in bed and preventing exposure. Persons with acute or chronic upper respiratory infections should at all times be kept away from the premature and congenitally weak infant, but where this is not possible, a gauze mask worn by the mother is effective.

One thing which is of the utmost importance, but which frequently is accomplished with difficulty, is putting children to bed when they have a fever and keeping them there until they are entirely well. Too often mothers will allow the pleas of the child to overrule their judgment or their discipline and a slight cold becomes a more serious matter by reason of exposure and fatigue. Furthermore, it is a common custom for parents to allow a child to get up as soon as the temperature becomes normal. The only safe rule to make is that an afebrile period of at least forty-eight hours should elapse after a respiratory infection before a child is allowed to be out of bed. Even then it should be a matter of one or two hours the first day, with a convalescent period of three days before he is allowed to go to school. A child has no judgment in conserving his strength, and the minute he is up he goes at top speed until exhausted.

Ether anesthesia should not be administered to a child suffering from even the mildest form of respiratory tract infection except in case of a grave emergency.

NURSING CARE

The first requisite in successful management is a capable, quiet nurse or attendant who understands the value of sickroom serenity and efficiency. A patient in the hospital has this matter taken care of automatically and the physician is relieved of a great responsibility, but the majority of cases are treated at home and by a mother who is perhaps willing and coöperative but lacking in nursing sense. Some people have it naturally, but we must recognize the instances where special instructions are necessary and by all means give them. This means sitting down and spending time in fundamental nursing instructions, but before we can do that we, ourselves, must know what constitutes good nursing care.

Temperature Readings.—A mother should be taught to read a thermometer, take the pulse and respiration so that these important observations

* From the Department of Pediatrics, Santa Clara County Hospital, San Jose.

* Read before the Pediatrics Section of the California Medical Association at the fifty-eighth annual session, May 6-9, 1929.

can be entered on a chart which we prepare for that purpose. A graphic chart is most valuable in following the course of a fever, and may show the first indication of an arising complication.

Ventilation.—Warmed fresh air is vital to the patient's well-being. Adequate ventilation may be secured through open windows, but during cold or stormy weather these should be in an adjoining room rather than the sickroom. This air should be warmed to a temperature between 65 and 68 degrees as actually recorded by a thermometer. In this connection I have observed a difference in temperature of six degrees between the height of a standard crib and the height to which it was raised by putting twenty-inch blocks under the legs. Hence the necessity of placing the thermometer near the child. Such a temperature permits the child to be clothed lightly. It is exhausting even to watch a hot, restless child struggle under many layers of clothing and bedcovers, with the necessity of lifting the added weight with every inspiration.

In addition to warming, the air may also be moistened to an advantage. Plain unmedicated steam is very effective, or compound tincture of benzoin, oil of eucalyptus, or turpentine may be added to the water. Inhalations may be given for thirty minutes at intervals of every two or three hours and preferably under a canopy. It is not advisable to use a closed tent because of the extreme heat which develops, with resulting perspiration and possible chill afterward.

Medicated Air.—The safest apparatus is an electric vaporizer, or an electric plate on which is placed an open vessel. The croup kettle with an open flame is more commonly employed at home, but certain precautions must always attend its use. First it should not be placed so close to the crib that the child can reach out and get a steam burn, or tip it over and start a fire. The kettle should never be allowed to boil dry if benzoin is used in the water because such fumes are most irritating. All of these mishaps have occurred in my experience at one time or another, but constant warnings have reduced their frequency.

Inhalations should be continued as long as there is a distressing cough or scanty secretion. The milder cases may be sufficiently relieved by simply allowing a kettle to boil constantly in the sickroom.

Diet.—It is quite possible to give specific instructions to the nurse regarding diet, but these will necessarily vary with the individual child. Bearing in mind the possible protracted course of the disease, it is necessary to encourage the intake of as much nourishment as the digestive apparatus can tolerate. This is where an understanding nurse can be of great assistance. The various foods should be bland and easily digestible. These would include milk, broths, soft eggs, pureed vegetables, or creamed vegetable soups, scraped beef, jelly, junket, custard, and fruit juices. Milk is sometimes vomited, but this may be avoided by giving it hot and with the addition of bicarbonate of soda. In general, it is better to offer small amounts of food at more frequent intervals than three large meals a day.

Care of the Bowels.—A daily bowel movement is to be desired, but it is the exception to have this occur spontaneously. If the movements are soft there is no objection to irregularity, but if constipation occurs the use of mild laxatives is indicated. Milk of magnesia, cascara, and phenolphthalein are usually effective, aided when necessary by an enema to empty the lower bowel. The problem should always be handled so as to disturb the patient as little as possible.

Counterirritants.—The use of some form of counterirritation is beneficial when pleural pains and cough are prominent symptoms. Mustard plasters are perhaps most effective. Variations in the strength of mustard and the sensitiveness of the skin make it impossible to give definite instructions regarding the proportions until a trial has been made. Strengths varying from one of mustard to six of flour to as strong as equal parts may be used. This is mixed with cold water, spread thinly on a cloth, warmed, and applied to back, sides, and chest for a period ranging from ten to thirty minutes. This may be repeated as often as every four hours.

Counterirritation is otherwise accomplished by applying flannel cloths wrung out of hot water and mustard, or with turpentine stupes.

Hydrotherapy.—A maxim which I have always thought particularly apt is "plenty of water inside and out." A child will voluntarily take a certain amount, but rarely is it sufficient to meet the demands of his toxemia. Further intake may be encouraged by offering orangeade, lemonade, any of the canned fruit juices or bottled soda water, given as such or diluted with water.

Sponging should be carried out daily at least once. A sponge bath at a temperature of 90 degrees, given under the covers so that the child will not be exposed to the air, often results in a refreshing sleep of several hours. Hyperpyrexia in itself may do little harm unless accompanied by nervous manifestations. An ice-bag to the head and a tepid sponge can transform a delirious patient into one enjoying a quiet sleep.

Just a word regarding sponging: Most mothers fear the procedure as one which may cause the child to take more cold. This should not result if the patient is not exposed and the bath is begun at a temperature of 95 degrees, gradually being reduced to 90 degrees and even 85 degrees, according to the degree of fever. To be most effective the cloth should be wrung fairly dry, the bath continued for ten to fifteen minutes, and the moisture allowed to evaporate on the skin.

Abdominal Distention.—This unpleasant occurrence is quite frequent. When it first appears, all food should be withheld for twelve hours and a cathartic given.

Turpentine stupes, and enemas of soda, turpentine, or milk and molasses will relieve the milder cases. If these are ineffective, one-half cubic centimeter of obstetrical pituitrin should be given every three hours, or as needed.

A persistence of the condition after these measures have failed—and they unfortunately will fail

sometimes—usually means the development of peritonitis or approaching death as a result of circulatory failure.

DRUG TREATMENT

The parents' importunate demands that something be done in a critical case often leads us into the error of prescribing medication which serves no useful purpose in our scheme of treatment, but does irritate and exhaust the child in the effort to administer it. Furthermore, it is apt to turn him against taking nourishment by mouth and make it difficult to give that which is most needed.

These parental demands may be met by emphasizing the importance of rest, less disturbance, and the hour by hour nursing care. I believe we are well repaid for such time spent in education. A case in point was a mother who stated to me recently that she had succeeded with minor colds of the past winter by the common-sense care which she had given her children, as learned by experience with pneumonia the preceding year. and drugs played very little part in this case.

Cough.—Children with pneumonia always cough and this symptom does demand our consideration. The warmed fresh air, inhalations, and counter-irritation are the first things. Hot drinks are very soothing. One ounce of hot milk with a little baking soda, given frequently, will often allay a distressing spasm of coughing. In the early stage, when secretions are scanty, syrup of hydriodic acid is effective. To this may be added chloroform water, sodium bromid or codein as a sedative and the whole made palatable by flavoring with syrup of raspberry. Codein is a drug which can be given with sure sedative effect and no danger of habit formation. I have never heard of a codein addict.

Rest and Sleep.—Rest and sleep are very necessary in the conservation of strength, but hyperpyrexia may result in a distressing degree of restlessness or insomnia. At such a time it is desirable to insure sleep and the use of sodium bromid, veronal, or other soporific is definitely indicated.

Cyanosis.—Cyanosis may appear as a result of improper ventilation, extensive involvement of the lung tissue or plugging of the bronchi with secretions. The inhalation of oxygen has been of decided benefit, although this is an open question with many clinicians who feel it to be inefficient.

Circulatory Failure.—Circulatory failure has always been one of the most feared symptoms in pneumonia. As a matter of fact clinical study has shown that as an isolated event it occurs very seldom. Rather it is associated with a terminal collapse in which there is respiratory failure, abdominal distention, acute sepsis, and rapid death. Heart stimulants, such as strophanthin, caffein, atropin, or adrenalin, are to be given. Routine digitalization has given rise to a great deal of discussion and may be a harmless procedure if not carried too far. It has not been my practice to give it as a matter of routine.

Respiratory Failure.—Respiratory failure as evidenced by dyspnea, cyanosis, and restlessness are more amenable to stimulation. Nothing is more effective than the mustard pack. It is quickly and readily prepared from materials which are instantly available. Further than this, atropin, oxygen inhalations, and whisky or brandy may be used.

Specific Therapy.—If bacteriological study has shown the patient to have a Type I pneumococcus infection, specific serum therapy should not be forgotten.

BLOOD TRANSFUSION

I have recently been interested in the effect of blood transfusion in cases of prolonged acute infections and have transfused six infants who were ill with bronchopneumonia.

One was a protracted case which had been through a stormy two weeks and was showing definite improvement when the other lung became involved. About 150 cubic centimeters of whole blood was given, and although the child did not completely recover for another three weeks it was the impression of both myself and the parents that the child's vitality was definitely greater after the transfusion. A complicating factor was a double suppurative otitis media.

The second case was one which was sent into the hospital with a complicating empyema. A rib resection was done, and 125 cubic centimeters of whole blood given; the patient died twenty-four hours later.

The other four cases were infants who had been sick from four to eight days with profound toxemia and prostration. Amounts of blood varying from 86 to 125 cubic centimeters were given, and each one showed a prompt decline in the temperature and improvement in the general condition. They were convalescing within a week. The oldest of these six babies was sixteen months. In each case the blood was given into the longitudinal sinus.

COMPLICATIONS

Dehydration.—Some of the sickest children I have seen have been those who were allowed to develop a marked degree of dehydration. I have already mentioned the necessity of forcing fluids by mouth. If a satisfactory amount, which means from one to two quarts a day, cannot be given in this manner, we must resort to infusions or intraperitoneal injections. Large amounts of normal salt solution can be given by hypodermoclysis. Glucose solution may also be given in this manner although there are reports of cases in which sloughing occurred after such injections. In the peritoneal cavity, Ringer's solution is preferable. From 200 to 500 cubic centimeters may be given every eight to twelve or twenty-four hours with complete absorption and without irritation. This latter advantage makes it superior to normal saline or glucose. The giving of fluids by rectum is very unsatisfactory. A few ounces may be retained at first, but repetition of the procedure results in such irritation of the rectum that further retention is impossible. The intraperitoneal route is the one of choice because it is less painful and can be repeated frequently. At the same time absorption is not so rapid as to thrust a burden on the cardiovascular system.

Otitis Media.—Infection of the middle ear is always possible when there is an infection in the upper air passages; in pneumonia it is one of

the most frequent complications. The infection may be through the blood stream or through the eustachian tube, the latter favored by the ever present cough. The only certain way to detect the condition early is by frequent examinations of the ear-drums. Otitis media may, and frequently does, occur without causing pain. The ears are objects of suspicion also when there is a sudden rise in temperature, increasing restlessness, rolling of the head from side to side, or the definite complaint of earache.

Pain alone is relieved by the application of dry heat or moist compresses. Carbolized glycerin is a favorite remedy and causes a local anesthesia of the drum membrane which is useful if a paracentesis becomes necessary.

The best procedure is to irrigate with hot boric acid solution. One teaspoon of boric acid crystals is dissolved in a pint of water, heated to a temperature of 100 degrees Fahrenheit, and placed in an irrigating can which is held above the ear about one foot. This avoids excessive pressure against the drum. A pointed glass tip is used on the end of the tubing and each ear canal douched with the entire amount. This is repeated every three hours and serves not only to allay the pain, but also to relieve the inflammation. Once the mother understands the procedure, it is easier than the rubber syringe method, and more effective because of the constant gentle flow.

An ear-drum which shows increasing redness and swelling should be incised early. If carefully performed it will not result in introducing any outside infection and does allow the escape of gas and serum. Prompt healing and relief of the symptoms will usually follow.

If distinct bulging of the drum membrane has occurred, the paracentesis will be followed by drainage of pus for from a few days to three weeks and sometimes even much longer. During this period, douching should be carried out carefully and continually, and the external ear kept scrupulously clean to avoid the development of furunculosis.

Pyelitis.—Urinary tract infections will frequently follow a focus in the respiratory passages, and while pyelitis is not a common sequel of bronchopneumonia, examinations of the urine must be made as the only means by which its presence can be detected. A moderate albuminuria is to be expected, but persisting pyuria demands the recognition and treatment of pyelitis.

Empyema.—Empyema is a serious, though not very frequent complication of bronchopneumonia. In the daily examination of the chest the presence of fluid may be detected. An exploratory thoracentesis will confirm the diagnosis. If the effusion is clear, simple drainage may relieve the condition without recourse to surgical drainage. Purulent fluid demands rib resection and adequate drainage. Confidence must be placed in a competent surgeon to decide the correct procedure in the individual case.

Meningitis and Meningismus.—Symptoms of meningeal irritation demand early spinal puncture for two reasons. First, it is the only way by which we can differentiate meningitis from meningismus; and, second, it is good treatment in either case. Repeated spinal drainage offers the best hope of relief in meningitis, and will alleviate the marked nervous symptoms of meningismus.

CONVALESCENCE

All children with bronchopneumonia should be kept in bed at least one week with a normal temperature. This time should be extended for the severe cases and those with persisting cough, but in any case the child should feel perfectly well before he is allowed to get up. Recurrences would thus be avoided and ultimate complete recovery hastened. Exercise at first should be very limited and the patient's initial period out of bed should be no longer than fifteen to thirty minutes. This is gradually increased each day, as returning strength permits. In allowing the patient to be out of doors, it must be remembered that the child has become accustomed to the atmosphere of the house and these fresh-air periods must be carefully guarded and of short duration.

The diet need not be limited and the appetite is usually such that it is not necessary to force food. Cod-liver oil is one of the best reconstructive tonics; syrup of ferrous iodid or saccharated carbonate of iron may be added if the infection has been prolonged to the point of producing a secondary anemia.

SUMMARY

The treatment as outlined is based upon clinical observation and experience with cases in the writer's practice. It necessitates highly intelligent care: care which safeguards against serious complications by treatment of simple respiratory infections, which recognizes all possible complications, and which is painstaking and tireless in surrounding the patient with all possible hygienic protection. The fundamental principles are proper rest, fresh air, proper food, hydrotherapy, and symptomatic medication.

215 Sainte Claire Building.

DISCUSSION

EDWARD J. LAMB, M. D. (1515 State Street, Santa Barbara).—Doctor Cook's paper brings before those present at this Pediatric Section a conservative, concise and effective means of treating bronchopneumonia.

I consider the nursing care of these patients of the utmost importance. Quietness, rest, fresh air, and proper nourishment are the chief essentials.

I am glad to hear Doctor Cook emphasize the importance of fresh air being warmed to a temperature of 60 to 65 degrees. So many mothers and nurses feel that fresh air becomes stale when warmed to this temperature, and consequently our little patients suffer a relapse or reinfection when a portion of the exposed body becomes chilled by this cold air.

Concerning medication, great relief of dyspnea may be afforded by inhalation. Drugs given internally may be limited to atropin, iodin, opium (alkaloids), and ammonium salts.

WILLIAM A. BEATTIE, M. D. (Medico-Dental Building, Sacramento).—Bronchopneumonia is in most instances not difficult to diagnose, but in almost every case we are confronted with obstacles and difficulties in its treatment. There is no specific to use in bronchopneumonia, and for that reason, if for no other, we welcome the privilege of listening to this unusually well-developed system of its general treatment as presented by Doctor Cook.

We know that bronchopneumonia is largely a preventable disease, and too much emphasis cannot be placed on this phase of its treatment. In this disease

most certainly "an ounce of prevention is worth a pound of cure." Advice given to parents as to the proper method of treating common "colds," or even better, methods of preventing the spread of this common infection, will help in no small measure to prevent the development of bronchopneumonia. In the vast majority of children who contract this disease, we find them either subnormal in nutrition or neglected in the care given them during the course of a simple infection of the upper respiratory tract. The consequences are the development of the dangerous disease, bronchopneumonia. The fact of lowered resistance may be the primary condition which has made them a victim to infection. In other words, bronchopneumonia is usually a disease secondary to a mild respiratory infection which is found in the majority of instances, in children whose care or development has been faulty. It is therefore of particular importance that in any outline of the treatment of bronchopneumonia, special emphasis be laid upon prophylactic measures.

*

ADELAIDE BROWN, M. D. (909 Hyde Street, San Francisco).—Doctor Cook's paper emphasizes the importance of nursing in bronchopneumonia. Every mother should be able to take temperature, record bowel movements, diet (amount taken), and count pulse and respiration in the sleeping child, and keep a log of the day's happenings. *Written* instructions should be left, whether the mother or a nurse carries out the orders. In the one case they are an encouragement and save uncertainty; in the other, they save discussion between the mother and nurse.

In using a croup kettle or a steaming apparatus, I have it set in a metal basin as a precaution against fire. For the restless baby, or young child with high temperature, packs changed every two or three hours are less irritating than sponging and avoid narcotics and reduce temperatures.

For enemata to reduce gas, milk of asafetida with equal parts of water or molasses and milk do not irritate as more powerful purgatives do.

Conservation of strength is the sheet anchor of success in these cases.

SURGICAL AND NONSURGICAL FACIAL NEURALGIAS*

By MARK ALBERT GLASER, M. D.
Los Angeles

DISCUSSION *by Samuel D. Ingham, M. D., Los Angeles; H. Douglas Eaton, M. D., Los Angeles; Walter F. Schaller, M. D., San Francisco.*

USUALLY when neuralgia of the face is considered, attention is directed to the trigeminal tract. This neuralgia is an extremely important disease entity, but the many painful affections involving the face and referable to other cranial nerves should not be disregarded.

TRIGEMINAL NEURALGIA

Trigeminal neuralgia was recognized by Avicenna in A. D. 1000, and was later described by Schlichtung (1748), Nicolous André (1756), who first named it "tic douloureux," and Fothergill (1773), who accurately described the disease. Very little can be added to the original description of acute attacks of sharp, lancinating pains, usually with freedom from pain between attacks, but in some cases, a sense of soreness persists in the painful zone. The attacks of pain are brought on by contact, and in the more severe cases by even a breath of air or spontaneously. The severity of the pain varies greatly, and in most cases the individuals may carry on their daily routine; it is only in rare cases that they become confined to bed fearing the extreme consequences of the attacks. The pain is superficial and is in the zone of the trigeminal nerve. Trigger zones are present (Patrick), and there are never any areas of anesthesia.

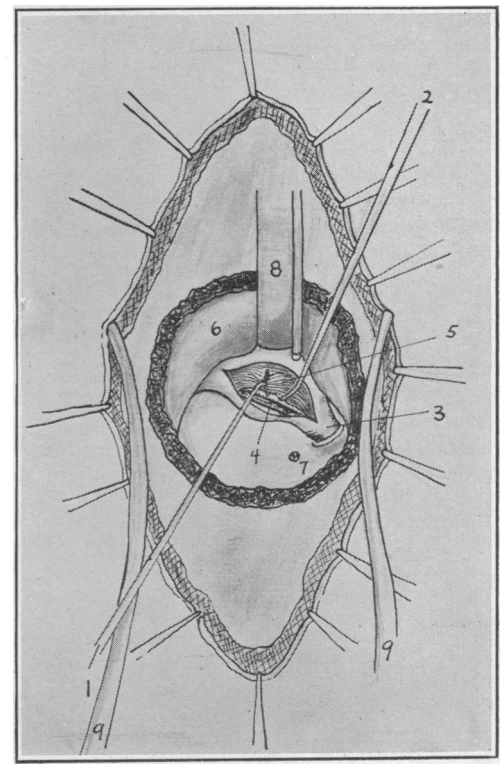

Fig. 1.—A semi-diagrammatic sketch demonstrating subtotal section of the sensory root of the trigeminal nerve. 1. Hook cutting the second and third division fibers. The fibers supplying the first division are intact. 2. Hook pulling the sensory root upward so as to expose the motor root. 3. Third division of the trigeminal nerve. 4. Motor root. 5. Ganglion. 6. Dura. 7. Middle meningeal artery. 8. Illuminated retractor elevating the brain. 9. Self-retaining retractor.

Trigeminal neuralgia is a disease of unknown etiology, spontaneous in origin, continuing uninterrupted through the patient's life, unless arrested by surgical procedure. No single instance of spontaneous cessation has been recorded. The treatment of trigeminal neuralgia is either alcohol injection of the nerve trunks, or surgery. Recently trichlorethylene has been introduced and the results have been satisfactory in some cases, though only temporary.

The surgery of the trigeminal tract is one of many interesting advances. Rose in 1892 resected the ramus of the mandible and curetted away the gasserian ganglion. Hartley and Krause published their contributions a month apart which consisted of the intracranial section of the peripheral branches of the gasserian ganglion through a middle fossa approach. The next great step was made by Spiller and Frazier when they divided the sensory root (1901). In 1915 Frazier advised a subtotal resection so as to prevent a

* Read before the Neuropsychiatry Section of the California Medical Association at the fifty-eighth annual session, at Coronado, May 6-9, 1929.